

LECTURE: 4

ETD 801S: Science, Technology & The Development Process

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TIME: 7:30 – 10:30 AM

VENUE: LT 11

Presentation Outline

- How the West Grew Rich
- The Technology link to economic development
- Second Best development strategy
- Excerpts from Japan's Industrial Development

How the West Grew Rich

By Rosenberg & Birdzell

1. In the 19th & 20th centuries, the manufacturing and trading sphere were largely *autonomous from political or religious actions or restriction*. The working assumption was that industry and commerce served the general purpose, so that it was the business of government to support and encourage and also concentrate on the development of other aspects of government.
2. Incentives were necessary for the actors in the marketplace to bring about growth. However, *incentives only cannot enable a community to do what it does not know how to do*.

How the West Grew Rich cont'

3. *The immediate sources of Western growth were innovations in trade, technology, and organization, in combination with accumulation of more and more capital, labour, and applied natural resources. Innovation emerged as a significant factor in Western growth as early as the mid-fifteenth century, and from the mid-eighteenth century. Firms, markets and competition have been important driving forces in the process of innovation.*

The Technology Link to economic development

By Susan U. Raymond

She research revealed that knowledge, information, and innovation now surpass most natural resource endowments as strategic economic resources for development. All three (knowledge, information and innovation) imply a central role for technology in economics.

Relationship between technology and economic development

1. Technological capacity is critical aspect of productivity in virtually all industries
2. High-tech companies are Growing determinant of the health of overall industrial development.

The Technology Link to economic development cont'

3. Technology is also the base of infrastructure upon which all economic sectors depend;
4. Technological skills and technology as a mode of instruction, are critical aspects of a competitive workforce.

Four dimensions of the link between technology and economic development

1. Technology and nation's economy (*current capacity?*)
2. Innovation & entrepreneurship (*conditions for newness?*)
3. Industries: science, technology and growth (*state today?*)
4. Labour: technology and human resources (*needed skills?*)

Best Development Strategy

Harmonious Development

- The key to development is the right application and combination of factor proportions (capital, labour, raw material) and their balanced growth over time.
- By using technology most suited to their factor proportions, *almost all LDCs have the means required to make development possible without outside help*. If the technology problem is not solved, exhortations about unity, hard work, appeal to non-corrupt practices, etc are irrelevant.

Best Development Strategy cont'

- *No country starts the development process with lots of capital resources.* Most countries have more labour and natural resources. These are usually combined with the little capital to create wealth. Wealth is accumulated as capital. The growth in capital stock changes the factor endowment proportion which, in turn, should lead to a continuous evolution of the technology towards an eventual capital-biased strategy of development.
- For harmonious development technology must seek the full utilization of its factor endowment. *In other words, technology is not of universal application.*
- Given the right conditions, dev't happens spontaneously⁸.

Non-Harmonious/ Second-Best Development Strategy

- The capital accumulation model may not be suited to the conditions and needs of LDCs.
- Capital is scarce factor in most LDCs and adoption of the capital accumulation model necessitates support from outside.
- This support manifest itself in the form of import dependency, i.e. the use mainly imported equipment and machinery, intermediate inputs and raw materials in the economy's development.
- Import dependency in an underdeveloped environment poses staggering limitations for economic growth and modernization.

Non-Harmonious/ Second-Best Development Strategy cont'

Some problems:

1. The generally low technological sophistication leads to importation of equipment and machines which have been used for half their life span and abandoned for lack of repair and maintenance
2. The lack of repair and maintenance capacity has necessitated the importation of machines and equipment at more frequent intervals than had been expected.
3. Strong ties with foreign suppliers inhibits endogenous technological development.
4. There is very little scope, willingness or the technical ability for substituting local raw materials for imported material.
5. Our undue dependence on imported technology means that we cannot rely on local S&T.

Non-Harmonious/ Second-Best Development Strategy cont'

6. FDI's exacts a huge cost in transfers of profits, interests, royalties, technical assistance, fees, salaries and other financial inducement paid to foreign personnel.
7. The massive imports of machinery and equipment has brought in modern technology rather than technological knowledge.
8. Tax rebates to encourage foreign investment.
9. The overpricing of foreign goods for construction and other industrial projects;
10. Assets which operate below optimum efficiency, e.g. poor failure, faulty telephone systems, etc.

Non-Harmonious/ Second-Best Development Strategy cont'

Developmental effect of these leakages and costs

1. Present development efforts make only marginal contributions to the economies of LDCs.
2. Capital projects, whether they are factories, dams or refineries, have no control effect. They do not enthuse the local people to try out new techniques and ideas.
3. Building infrastructure for development is capital intensive. Capital is the result of a transformation involving labour and natural utilizing technology. Therefore, the beginning of development should be the development of capital through this interaction of labour and natural resources. Thus, a pattern of development that starts by investing in a large infrastructure cannot provide a base for development but a means for underutilizing or rejecting human and others resources in the development process.

Non-Harmonious/ Second-Best Development Strategy cont'

4. Factor proportions differentiate the advanced industrial economies from LDCs. Capital is the least scarce factor in developed countries; labour and/or natural resources are least scarce in LDCs. This difference should imply very different development strategies

Excerpts from Japan's Industrial development, 1868 - 1939

- National system of education stressing scientific and technological education (Africa was looking skills).
- Japan banned foreign investment between 1863 -1899.
- Invested large amount in infrastructure (*telegraphs, postal service, water supply, coastal shipping, ports, harbours, bridges, lighthouses, river improvements, railways, electricity, gas, and technical research*).
- Strengthen domestic politics and economic control

Excerpts from Japan's Industrial development, 1868 – 1939 cont'

■ Technological borrowing – Japan did not rely on foreign aids but paid full cost of acquiring foreign technical expertise. Between 1868 and 1892, the central government directed technological transfer by spending 1.5% of its total expenditures for foreign employees, and an additional 0.4% for expenses *to send more than 4000 students and government officials for training and education abroad*. The ministry of industry, which invested in heavy and chemical industries, mining, and infrastructure, employed almost 1000 foreign experts, advisors, and teacher from 1870 to 1885 *to establish agricultural experiment stations to introduce Western farming methods and products and model factories to transfer technology to light industry*. Ministry of finance drew on 125 experts *to help set up a modern monetary system and introduce corporate business organisation*.

Excerpts from Japan's Industrial development, 1868 – 1939 cont'

- Japan learned and modified to save capital or conform to local confirm and factor proportion.
- The government made serious efforts to expand primary and vocational education which focused on the West scientific and technical education.

Import –substitution (IS) and Export-orientation (EO): southeast Asian countries

Studies show that most of the southeast Asian countries used IS and later shifted EO at a point. Thus,

- Korea and Taiwan = IS in early 1950s but shifted to EO in the late 1950s.
- Malaysia and Thailand = IS in late 1950s but shifted to EO in the late 1960s.
- Indonesia = shifted to EO in the 1980s
- Vietnam shifted to explicit EOI in the context of the liberalization measures associated with its transition from a socialist to a market economy.
- Almost all of these countries successes in their process.

Import –substitution (IS) and Export-orientation (EO): southeast Asian countries cont'

What factors accounted for the success of the process of industrial development?

■ **The environment:**

- The state provided direction, adopted measures to cushion losses, supported acquisition of skills.
- The state invested in infrastructure
- There were also selective interventions
- The state various times undertook economic and trade reforms

■ **The process of industrialization:**

- All the countries used domestic market-led industrial development (i.e. used cheap labour).
- They concentrated on training the workforce and upgrading and late diffused among the indigenous working population and still being practiced.

SYNERGY TIME

- Any problem should be brought forward for discussion.
- Suggestions are welcome
- Wise saying & inspirational words

LETS ENJOY OUR STAY